Cisco and Canonical: Cisco Network Virtualization Solution for Ubuntu OpenStack

What You Will Learn

Cisco and Canonical extend the network virtualization offered by the Cisco Nexus® 1000V Switch to Ubuntu OpenStack.

Overview

Cisco and U.K.-based Canonical Group Limited recently announced the Cisco Nexus 1000V Switch networking solution for Ubuntu Linux and Ubuntu OpenStack cloud orchestration software. Along with support for Ubuntu's kernel-based virtual machine (KVM), the solution will enable Cisco Nexus 1000V customers to bring enterprise-class networking to their open source cloud environments.

The Cisco Nexus 1000V is a distributed virtual switching platform that provides you with advanced networking features, integrated virtual services, and a consistent operating model across physical and virtual environments. It enables virtual servers to use the same network configuration, security policy, diagnostic tools, and operating models as their physical server counterparts, simplifying administration and reducing complexity.

You can also rely on the robust Cisco® NX-OS Software feature set and Cisco's innovative network services architecture for your virtual environments.

The Cisco Nexus 1000V Switch for KVM is tightly integrated with both Ubuntu KVM and Ubuntu OpenStack and supports:

- Policy-based virtual machine connectivity
- Mobility-aware virtual machine security and network policy
- Nondisruptive operating model for server virtualization and networking teams
- Virtual Extensible LAN (VXLAN)-based overlays for implementing scalable, multitenant cloud infrastructure

With the Cisco Nexus 1000V virtual networking platform, you can have a consistent networking feature set and provisioning process all the way from the virtual machine access layer to the core of the data center network infrastructure. The same network configuration, security policy, diagnostic tools, and operating models you now use on your physical servers can also be used for your virtual servers. Virtualization administrators can access predefined network policy that follows mobile virtual machines to help ensure proper connectivity, saving valuable time for virtual machine administration.

Canonical's Ubuntu OpenStack is the leading implementation of OpenStack in the marketplace. Canonical's sharp focus on delivery of enterprise-quality OpenStack to its customers is a result of the investments that Canonical has made in making OpenStack work with enterprise infrastructure such as the Cisco Nexus 1000V products.

Challenges

The increasing virtualization of Linux-based applications - and the demanding scalability, security, and availability requirements - has increased the operational complexity of modern data centers. In addition, companies must deploy applications more efficiently, and they require greater flexibility in the allocation of data center resources.

Customers are seeking a virtual networking solution that supports these highly dynamic and elastic environments. The solution must simplify the operating model associated with the diverging physical and virtual infrastructure, and offer reliable networking features and services to meet the varying needs of virtualized and cloud environments.

The Solution

Cisco Nexus 1000V for KVM provides a scalable, multitenant virtual networking solution for OpenStack deployments. It uses the highly resilient Cisco® NX-OS Software operating system and along with virtual machine-aware networking policies, it offers:

- Enhanced visibility and troubleshooting of virtual machine traffic through features such as Cisco NetFlow, Switched Port Analyzer (SPAN), Encapsulated Remote SPAN (ERSPAN) and packet statistics
- Advanced switching and security through features such as private virtual LANs (PVLANs), access control lists (ACLs), and quality of service (QoS)
- Simplified virtual networking operations and management through features such as Simple Network Management Protocol (SNMP), NetConf, and syslog and a strong partner ecosystem
- Scalable multitenancy support through features such as VXLAN segments

The Cisco Nexus 1000V for KVM has two important components:

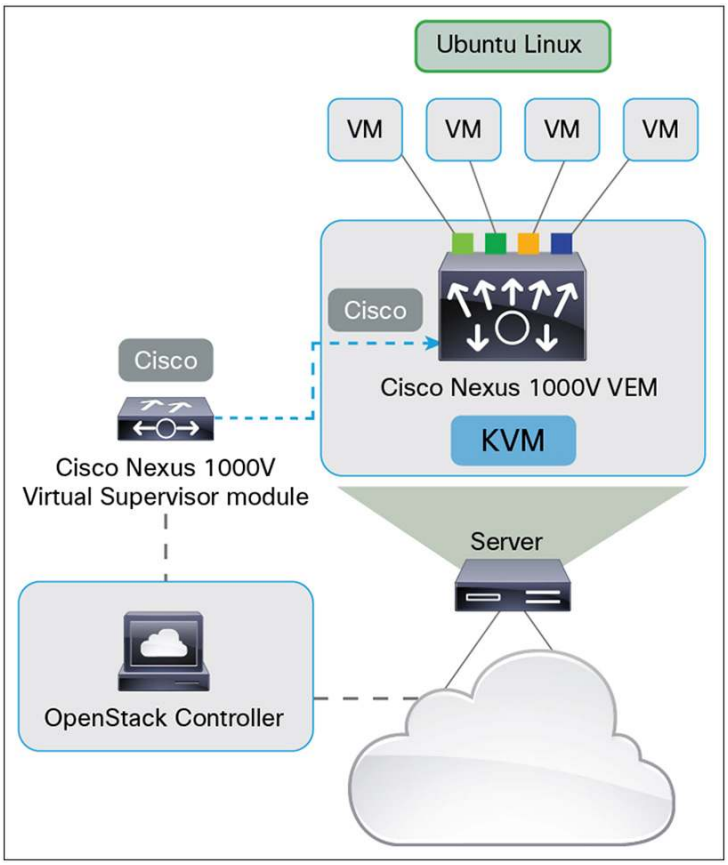
- Virtual Ethernet module (VEM): A hypervisor-resident component that is deployed on each physical host running KVM
- Virtual supervisor module (VSM): A virtual appliance that is tightly integrated with OpenStack; this component controls multiple VEMs and helps manage the virtual machine networking policies

The VSM offers a comprehensive set of northbound management interfaces and Representational State Transfer (REST) APIs, and these are used by the OpenStack Neutron Service to help automate virtual networking operations.

For customers seeking a dedicated appliance to host their virtual networking appliances such as the VSM, Cisco offers a physical appliance: the Cisco Nexus 1110-S Virtual Services Appliance.

The Cisco Nexus 1000V virtual switch running on Ubuntu Linux and KVM form the virtual network edge for Linux-based virtual applications. The Cisco Nexus 1000V VSM forms the management plane of the virtual network and connects through OpenStack Neutron APIs to support the OpenStack cloud orchestration platform (Figure 1).

Figure 1. Cisco Nexus 1000V Running on Ubuntu Linux and KVM



Solution Advantages

The Cisco Nexus 1000V virtual switch simplifies virtual networking operations by providing:

- A common management model for both physical and virtual network infrastructures
- Detailed control of virtual machine networking and security through the advanced Cisco NX-OS feature set
- Automation and flexibility through tight integration with OpenStack

More important, it offers policy-based virtual machine connectivity, mobility-aware virtual machine security and network policies, and a nondisruptive operational model.

Fast, Easy Virtual Machine Provisioning

To facilitate easy creation and provisioning of virtual machines, the Cisco Nexus 1000V introduced the concept of port profiles. Port profiles are policy templates, and they enable the administrator to define network policies for different types or classes of virtual machines. Port profiles provide a scalable mechanism for configuring networks with large numbers of virtual machines. When the port profiles include security policies, they formulate a complete service-level agreement (SLA) for the virtual machine's traffic.

Mobility of Virtual Machine Security and Network Properties

Network and security policies defined in the port profile follow the virtual machine throughout its lifecycle, whether it is being migrated from one server to another, suspended, hibernated, or restarted. In addition to migrating the policy, the Cisco Nexus 1000V VSM moves the virtual machine's network state. Virtual machines participating in traffic-monitoring activities can continue these activities uninterrupted by application mobility operations. When a specific port profile is updated, the Cisco Nexus 1000V virtual switch automatically provides live updates to all the virtual ports that use that same port profile.

The capability to migrate network and security policies makes regulatory compliance much easier to enforce with the Cisco Nexus 1000V virtual switch because the security policy is defined in the same way for physical and virtual servers and is constantly enforced by the switch.

VXLAN Scales LAN Segmentation

The Cisco Nexus 1000V offers support for VXLAN- based overlay segments in addition to VLAN-based segments. VXLAN is an IETF-proposed draft standard from Cisco and other industry vendors to address new requirements for scalable LAN segmentation and the stretching of Layer 2 segments across physical topologies for broader mobility. VXLAN defines a 24-bit LAN segment identifier that provides segmentation at cloud scale. In addition, VXLAN provides an architecture that customers can use to expand their cloud deployments with repeatable pods in different Layer 2 domains. VXLAN can also enable migration of virtual machines between servers across Layer 3 networks.

Conclusion

Cisco Nexus 1000V integration with Ubuntu OpenStack provides a best-in-class OpenStack solution for joint Cisco and Canonical customers, enabling:

- Ubuntu's customers to take advantage of Cisco Nexus 1000V infrastructure as part of their OpenStack deployments
- Cisco customers interested in OpenStack to continue to use the same excellent network virtualization solution from Cisco

OpenStack deployments can be difficult to implement, but this offering makes deployment of Cisco Nexus 1000V plug-ins alongside OpenStack easy.

For More Information

For more information, please visit:

- http://cisco.com/go/1000v

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Printed in USA C22-730808-00 01/14